

REMARKS

Prior to entry of this amendment, claims 1-15 are currently pending in the subject application. By the instant amendment, claims 1 and 7-9 are amended to more particularly recite the subject matter of the present invention. Claims 2, 3 and 5 have been amended to address confusing language. Claims 10-12 have been amended to modify the claim dependency thereof. Claims 16-18 have been added to recite limitations removed from amended claims 7-9. Claims 19-20 have been added to recite features originally disclosed but not previously claimed. No new matter has been added.

Applicants appreciate the Examiner's acknowledgement of applicants' claim for foreign priority and receipt of a certified copy of the priority document.

Applicants request the Examiner indicate the status of the drawings in the present application.

Claims 1-20 are presented to the Examiner for further or initial prosecution on the merits.

A. Introduction

In the outstanding Office action, the Examiner rejected claims 2-4, 7 and 10 under the second paragraph of 35 U.S.C. § 112 as being indefinite; rejected claims 1-2, 4-7, 9 and 13-15 under 35 U.S.C. § 102(a and e) as being anticipated by U.S. Patent No. 6,407,435 to Ma et al. ("the Ma et al. reference"); rejected claims 1-2, 4-7, 9 and 13-14 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,688,724 to Yoon et al. ("the Yoon et al. reference"); rejected claims 10 and 12 under 35 U.S.C. § 103(a) as being obvious in view of the Ma et al. reference; rejected claims 10 and 12 under 35 U.S.C. § 103(a) as being obvious in view of the Yoon et al. reference; and rejected claims 3, 8 and 11 under 35 U.S.C. § 103(a) as being obvious over the Ma et al. reference further in view of U.S. Patent No. 6,320,213 to Kirlin et al. ("the Kirlin et al. reference").

B. Asserted Indefiniteness Rejection of Claims 2-4, 7 and 10 (and apparently claim 5)

In the outstanding Office action, the Examiner rejected claims 2-4, 7 and 10 under the second paragraph of 35 U.S.C. § 112 as being indefinite.

By the instant amendment, claims 2 and 3 have been amended to eliminate the term “electrode” and to clarify that the metals and oxides thereof are being claimed. Regarding the particular materials listed in claims 3 and 4, while the Examiner correctly notes that Al is a group III metal, it is respectfully submitted that all of the metals listed are in groups III, IV and V. In particular, it is noted that Ta is a group V metal, and Ti, Hf and Zr are all group IV metals. Therefore, it is respectfully submitted that claims 2-4 now clearly recite the present invention. Claims 7 and 10 depend from claim 2, and were not discussed separately. Therefore, it is respectfully submitted that since base claim 2 is now clear, claims 7 and 10 are also now clear. Therefore, it is respectfully requested that this objection be withdrawn.

Claim 5 was also apparently objected to due to the alleged indefiniteness of the range recited therein. By the instant amendment, claim 5 has replaced this range with --one to two orders of magnitude of Å--. This is consistent with the original language, but clearly precludes the thousands of scenarios noted by the Examiner. Therefore, it is respectfully requested that this objection be withdrawn.

C. Asserted Anticipation Rejection of Claims 1-2, 4-7, 9 and 12-15

In the outstanding Office action, the Examiner rejected claims 1-2, 4-7, 9 and 13-15 under 35 U.S.C. § 102(a and e) as being anticipated by the Ma et al. reference. Claim 1 has been amended to more clearly recite the present invention. It is respectfully submitted that amended claim 1 defines the present invention over the Ma et al. reference.

Claim 1 has been amended to recite that the method includes --diffusing material in each of

the oxidation barrier layers into adjacent dielectric layers sufficient to alter at least one characteristic of each of the plurality of dielectric layers--. Such diffusion is disclosed, for example, in paragraph [0034] of the original specification.

In addressing the diffusion limitation present in original claims 7 and 9, the Examiner noted that the process in the Ma et al. reference would inherently involve some diffusion. Claim 1 has been amended to clearly recite the purposefulness of this diffusion and define the present invention over incidental diffusion. Even though the thermal process in the Ma et al. reference may overlap with the temperature parameters set forth in the present specification, as noted in paragraph [0034] of the original specification, it is the duration of the thermal process that provides the diffusion. Therefore, it is respectfully submitted that the thermal process in the Ma et al. reference would not inherently result in the diffusion as set forth in amended claim 1. Therefore, it is respectfully submitted that the Ma et al. reference fails to disclose or suggest the present invention as now recited in amended claim 1.

The remaining rejected claims depend either directly or indirectly from claim 1, and are believed to be allowable for at least the reasons set forth above. Further, regarding amended claims 7 and 9, support for the degree of diffusion recited therein may be found in paragraph [0012] of the original specification. Therefore, it is respectfully requested that this rejection be withdrawn.

D. Asserted Anticipation Rejection of Claims 1-2, 4-7, 9 and 13-14

In the outstanding Office action, the Examiner rejected claims 1-2, 4-7, 9 and 13-14 under 35 U.S.C. § 102(b) as being anticipated by the Yoon et al. reference. Claim 1 has been amended to more clearly recite the present invention. It is respectfully submitted that amended claim 1 defines the present invention over the Yoon et al. reference.

Claim 1 has been amended to recite that the method includes --diffusing material in each of

the oxidation barrier layers into adjacent dielectric layers sufficient to alter at least one characteristic of each of the plurality of dielectric layers--. Such diffusion is disclosed, for example, in paragraph [0034] of the original specification.

In addressing the diffusion limitation present in original claims 7 and 9, the Examiner apparently relied on the annealing disclosed in the Yoon et al. reference as inherently involve some diffusion. Claim 1 has been amended to clearly recite the purposefulness of this diffusion and define the present invention over incidental diffusion. Even though the temperature of the annealing in the Yoon et al. reference may overlap with the temperature parameters set forth in the present specification, as noted in paragraph [0034] of the original specification, it is the duration of the thermal process that provides the diffusion. Therefore, it is respectfully submitted that the annealing in the Yoon et al. reference would not inherently result in the diffusion as set forth in amended claim 1. Therefore, it is respectfully submitted that the Yoon et al. reference fails to disclose or suggest the present invention as now recited in amended claim 1.

The remaining rejected claims depend either directly or indirectly from claim 1, and are believed to be allowable for at least the reasons set forth above. Further, regarding amended claims 7 and 9, support for the degree of diffusion recited therein may be found in paragraph [0012] of the original specification. Therefore, it is respectfully requested that this rejection be withdrawn.

E. Asserted Obviousness Rejection of Claims 10 and 12

In the outstanding Office action, the Examiner rejected claims 10 and 12 under 35 U.S.C. § 103(a) as being obvious in view of the Ma et al. reference. Claims 10 and 12 depend indirectly from claim 1. As noted above, the temperature range of the thermal process set forth in the Ma et al. reference is not sufficient to read on the diffusing recited in claim 1.

Therefore, claims 10 and 12 are believed to be allowable for at least the reasons claim 1 is believed to be allowable. Therefore, it is respectfully requested that this rejection be withdrawn.

F. Asserted Obviousness Rejection of Claims 10 and 12

In the outstanding Office action, the Examiner rejected claims 10 and 12 under 35 U.S.C. § 103(a) as being obvious in view of the Yoon et al. reference. Claims 10 and 12 depend indirectly from claim 1. As noted above, the temperature range of the annealing set forth in the Yoon et al. reference is not sufficient to read on the diffusing recited in claim 1. Therefore, claims 10 and 12 are believed to be allowable for at least the reasons claim 1 is believed to be allowable. Therefore, it is respectfully requested that this rejection be withdrawn.

G. Asserted Obviousness Rejection of Claims 3, 8 and 11

In the outstanding Office action, the Examiner rejected claims 3, 8 and 11 under 35 U.S.C. § 103(a) as being obvious over the Ma et al. reference further in view of the Kirlin et al. reference. Claims 3, 8 and 11 depend indirectly from claim 1. The Kirlin et al. reference fails to provide the teaching noted above as missing from the Ma et al. reference. Therefore, claims 3, 8 and 11 are believed to be allowable for at least the reasons claim 1 is believed to be allowable. Therefore, it is respectfully requested that this rejection be withdrawn.

H. New Claims 16-20

Claims 16-18 have been added to recite the thermal process, which the current amendment deletes from claims 7-9. Claims 19 and 20 have been added to recite that the characteristic changed by the diffusing is a lattice constant, as disclosed, for example, in paragraph [0034] of the original specification.

I. Conclusion

Since the cited prior art references neither anticipate nor render obvious the subject invention as presently claimed, applicants respectfully submit that claims 1-20 are now in condition for allowance, and a notice to that effect is respectfully requested.

The remaining documents cited by the Examiner were not relied on to reject the claims. Therefore, no comments concerning these documents are considered necessary at this time.

If the Examiner believes that additional discussions or information might advance the prosecution of the instant application, the Examiner is invited to contact the undersigned at the telephone number listed below to expedite resolution of any outstanding issues.

In view of the foregoing amendments and remarks, reconsideration of this application is earnestly solicited, and an early and favorable further action upon all the claims is hereby requested.

Respectfully submitted,

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PETITION and
DEPOSIT ACCOUNT CHARGE AUTHORIZATION

This document and any concurrently filed papers are believed to be timely. Should any extension of the term be required, applicant hereby petitions the Director for such extension and requests that any applicable petition fee be charged to Deposit Account No. 50-1645.

If fee payment is enclosed, this amount is believed to be correct. However, the Director is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account No. 50-1645.

Any additional fee(s) necessary to effect the proper and timely filing of the accompanying-papers may also be charged to Deposit Account No. 50-1645.